ENERGY SAVING IN RELIGIOUS BUILDINGS

Volume II

Putting Practical Ideas to Work

Ontario
Ministry of Energy
Honourable Philip Andrewes
Minister

This report, prepared for the Ontario Ministry of Energy is published as a public service for the information of the public. The Ministry does not, however, warrant the accuracy of its contents and cannot guarantee or assume any liability for the effectiveness or economic benefits of the devices and processes described in the report.

Message from the Minister

Could energy prices put your religious organization "out of business"? It's not a pleasant thought. But energy costs have played a major role in the demise of at least one religious organization. When that organization closed its doors, the revenue from all sources was $23,000. Energy bills were $17,000 — or 74 per cent of all revenue — leaving only $6,000 for all the other activities of the organization.

World oil prices rose an astounding 1300 per cent between 1973 and July 1982. No wonder something everyone took for granted a decade ago is now a major concern among religious groups!

In times of relatively stable energy prices, there is a tendency to become complacent. But it's wise to err on the side of caution — to work now to implement practical, low-cost measures that will help make energy a manageable expense in the future. That way, your organization won't be caught short if prices start to rise again. And even if prices don't rise, the energy management measures you implement now will work to your benefit in the future.

In short, energy management is a no-lose proposition!

"Management" is the key. Too often, organizations become enthusiastic about the latest energy gadget and buy it, without determining whether that equipment suits them best.

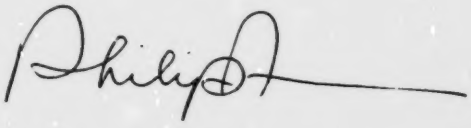
A far better approach is to bring energy costs under control by implementing an organized program with an eye on the bottom line.

The Ontario Ministry of Energy is working with Ontario's religious organizations, offering technical assistance and information to help them implement well-organized energy conservation programs. Many organizations have already taken steps to manage energy in their buildings. And these organizations are working together — through denominational and interdenominational networks, and through the Ministry itself — to pool their common knowledge.

This booklet will help those who want to implement programs to assess the conservation potential of their religious buildings. And for those who are already committed to energy management, the booklet will provide a quick double-check of possible conservation approaches.

Energy conservation in religious buildings has caught on here in Ontario. By working together, we can avoid being hurt by future price increases.

The best of luck in making energy management work for you!



Philip Andrewes
Minister of Energy

Contents

Introduction	**4**
The Energy Conservation Challenge	**5**
Surveying Your Building	**7**
a. The Front Entrance	7
b. The Sanctuary	7
c. Other Facilities	11
d. Furnace or Boiler Room	13
e. Outdoors	15
f. Residences	16
Taking Action	**17**
Conclusion	**19**
Two Case Histories	**19**
Bell's Corners United Church	19
St. John's Anglican Church, Bowmanville	20
Technical Assistance	**22**
For More Information	**23**
Religious Organizations Mentioned in this Booklet	**24**
Acknowledgements	**24**

Copies of this and other publications are available free of charge, from:
Ontario Government Bookstore
880 Bay Street
Toronto, Ontario
M7A 1N8

Out-of-town customers write to:
Publications Services Section,
5th Floor,
880 Bay Street
Toronto, Ontario
M7A 1N8
Tel. (416) 965-6015.

Toll free long distance
1-800-268-7540;
In Northwestern Ontario
0-Zenith 67200.

A small charge may be applied to bulk orders.

Introduction

Energy costs can best be controlled by implementing a well thought out, organized energy management program. Central to such a program are five basic steps:

1. Set up an energy management team.
2. Survey your building.
3. Decide on measures.
4. Make a detailed plan.
5. Implement the program.

The Ministry of Energy has already outlined some of the measures that religious organizations can take to save energy, in *(Energy Saving in Religious Buildings, Volume I.)*

This booklet, Volume II, stresses the second of the five steps. It takes you on a tour through your religious building(s). Rather than expensive gadgets, it emphasizes a low-cost, common-sense approach to energy conservation. The survey of the building as outlined in this booklet is not a highly technical exercise to be undertaken only by an engineering professional, but rather a quick assessment to be conducted by someone familiar with, and concerned about the workings of the building.

Once you have looked around and made some notes, you can then work with your energy conservation committee to decide which measures can be undertaken, make a detailed plan, and implement your program.

Care, Thought and Co-operation

Care, thought, and co-operation are three key words to keep in mind as you survey your building(s) looking for ways to manage energy. As you walk through the building, you will probably be amazed at the number of low-cost measures you can identify by taking a careful look at your facilities. By giving a great deal of thought to all possible measures and identifying those that will suit the budget and needs of your group, you will avoid expensive mistakes and make energy a no-lose proposition. And finally, by enlisting the co-operation of your energy conservation committee, you can make sure that the measures you choose are the ones that will best meet the needs of your organization.

The Energy Conservation Challenge

In Ontario, energy costs have risen dramatically over the past decade so that a religious organization that paid $1,000 for energy in 1973 can expect to pay about $4,000 in 1983!

Many religious organizations find the high cost of energy a major concern these days — and in some cases, energy costs are becoming prohibitive.

Could This Happen to You?
Such was the case with a beautiful, old Presbyterian church in Hamilton. This large, stone building was built more than a century ago, and was the house of worship for a congregation of about 350.

But recently, with declining membership and increases in its energy costs, this church became uneconomic to operate. In 1981, gross income from all sources was less than $30,000. Energy costs ate up more than half of that leaving an inadequate amount for all other purposes.

As a result, the church closed its doors, and the long-time, well-established congregation disbanded.

Beating Inflation with Conservation
On the other hand, some Ontario religious organizations began looking at conservation a long time ago and have found the payoffs worthwhile.

St. George's United Church in Toronto is an example of a congregation that has implemented a program to keep energy costs under control.

In 1976, the congregation of this church — one of the largest in Canada — set up an energy management committee headed by James Kappelle, a consulting engineer and head of the property committee. The program also received the enthusiastic support of the minister, Reverend R. Mumford.

The St. George's committee took a careful look at possible energy conservation measures, keeping in mind that there would be little point in spending thousands of dollars on renovations if they were only going to save a small amount per year.

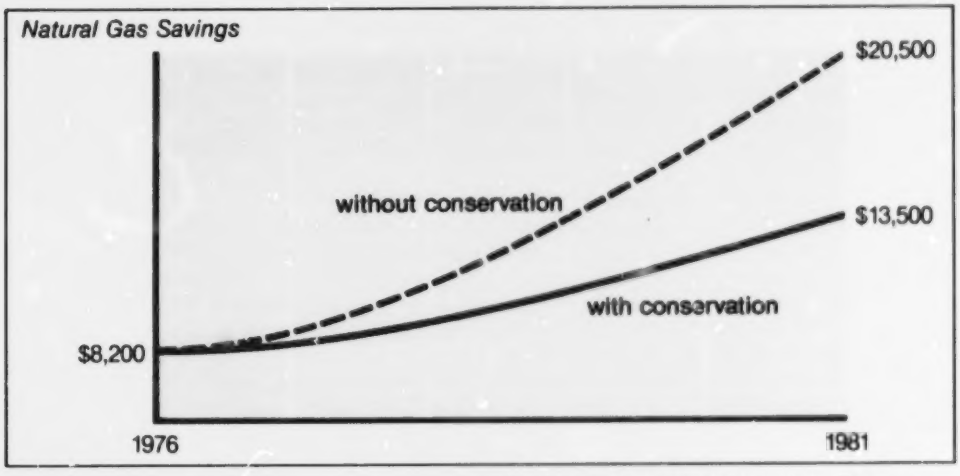
Members of the congregation worked to implement some of the measures and hired professionals to tackle others. These measures included installing de-stratification (or ceiling) fans, insulation, double-glazing of a memorial window, and scheduling activities to cut down on the building's heating load.

All of these measures have paid off. St. George's controlled its increase in gas costs to 34 per cent since the program began, and its electricity charges to 17.9 per cent (see Figure 1) between 1976 and 1982.

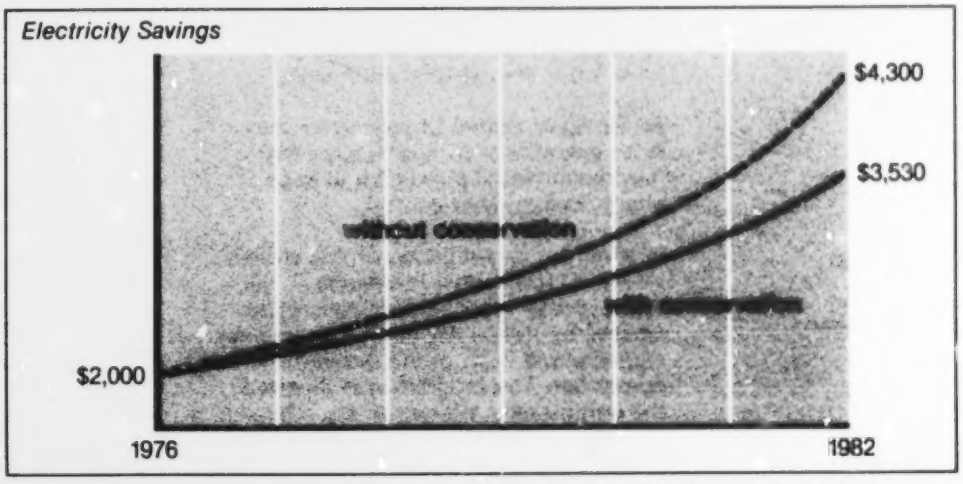
St. George's was one of the first organizations to take advantage of the savings possible with good energy management. More than 200 other Ontario religious organizations — with buildings ranging from cathedrals to one-room structures — have since started energy conservation programs.

How This Booklet Can Help
This booklet takes you on a walk-through tour of a typical Ontario religious building. Even if your group implements just a few of the lowest-cost measures suggested, you'll be well on the road to managing energy.

Figure 1 - Energy Savings at St. George's United Church.



St. George's United Church in Toronto paid $8,200 for gas in 1976. If the church had continued to use that much gas, the congregation would have paid $20,500 for gas in 1981. Since St. George's implemented an energy management program, the congregation paid only $13,500 for gas in 1981, a saving of over 30 per cent.



The story is similar for electricity charges. St. George's paid $2,000 for electricity in 1976. If the church had continued to use electricity at the same rate, the electricity bill for 1982 would have been about $4,300. But thanks to conservation measures, the congregation paid only $3,530 for electricity in 1982, a saving of over 17 per cent.

Surveying Your Building

A survey of a religious building is a very simple matter — just take this booklet with you, along with a pen and paper to jot down ideas. Start at the front entrance, and work your way through the building(s) all the way down to the furnace room. Then check the outdoors and other buildings.

Figure 2 provides a handy reference diagram showing the major elements of your building survey.

a. The Front Entrance
Take a good look at the doorstep as you approach the building. Is it worn? Is there a gap between the door and the step that could be letting in cold air? If so, consider having the step replaced.

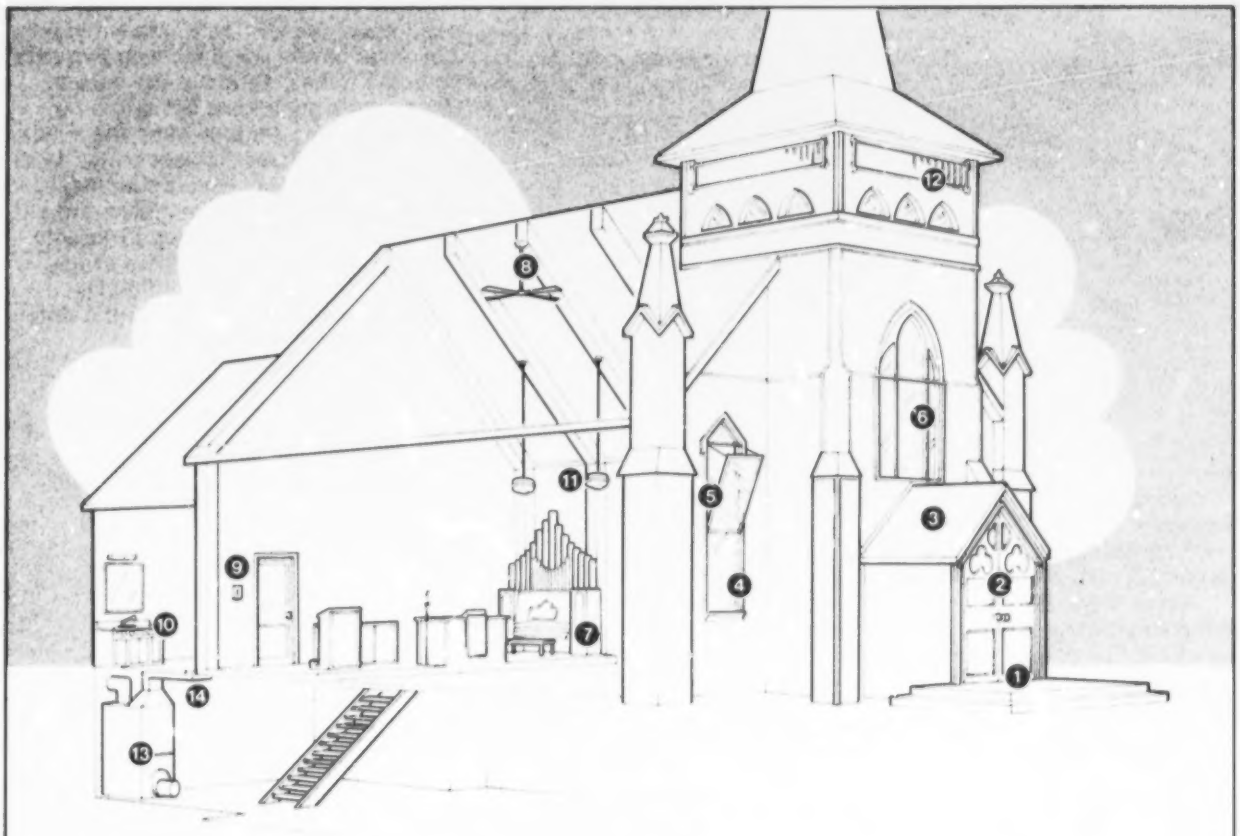
Look at the doors themselves. They can be responsible for considerable heat loss if they do not fit snugly and hang properly. A carpenter may be able to fix this with an hour's work. If the front doors are in very bad shape, you may decide to buy new ones that fit well.

Are the doors weatherstripped? Weatherstripping is an inexpensive way to keep out drafts, and the work can be done by someone within the congregation.

You may also want to consider installing storm doors, provided they will not harm the appearance of the building.

How about the vestibule? Many religious buildings have a vestibule with two sets of doors to help keep out the cold air. These are a good idea, but often the energy savings are lost when the inside doors are left open unnecessarily. "Door monitors" can help ensure that these doors are kept shut when not needed. At Deer Park United Church in Toronto, the ushers welcome members of the congregation to church on Sunday mornings — making sure that the door is closed behind them.

Figure 2 - The Energy Saving Religious Building



Legend

1. *Door step.* Make sure there isn't a gap between the door and the step, letting cold air in.
2. *Doors.* Check to see whether the doors fit snugly and hang properly. Weather-stripping and storm doors can help keep cold air out.
3. *Vestibule doors.* Are the inside doors propped open unnecessarily? Members of the congregation can help keep them shut.
4. *Windows.* Check to see whether any of the windows are broken or cracked and whether the windows are properly caulked.
5. *"Bucket" windows.* These can be a major source of heat loss if they do not fit snugly or if the closing devices don't work.
6. *Memorial windows.* Are they well caulked? Double-glazing can keep the heat in and protect the windows from vandalism.
7. *Organ.* There's no need to heat the whole sanctuary to keep the temperature constant for pneumatic-type organs. Spot heaters can do the same job, using much less energy.
8. *Destratification fans.* If there's a big temperature difference between the floor and the highest point of the ceiling, destratification fans can help send warm air from the ceiling down to where it's needed and reduce heat loss through the roof. But make sure the benefits justify the costs!
9. *Thermostat setback.* Turn down the heat in the sanctuary when it's not being used. You might also want to investigate programmable temperature control devices for even greater benefits.
10. *Hot water.* Check the condition of the water faucets and make sure that showers and toilets are operating properly.
11. *Lighting.* Check the level of lighting in all areas. Cut down on lights where possible.
12. *Ventilation.* Make sure that your rooms are properly ventilated. Too much ventilation wastes energy. In a tightly sealed building, you need air for the combustion furnace to work properly. If in doubt, seek the advice of a reputable heating contractor.
13. *Heating system.* Evaluate the heating system to determine whether there is a need to replace the existing equipment or switch to an alternate fuel.
14. *Pipes or ducts.* Make sure they are properly insulated, and do not leak.

St. George's United Church in Toronto double-glazed this memorial window to help keep the heat in and to cut down on vandalism.

Vestibules are not serving their purpose if the doors are kept propped open for convenience during the religious service. Deer Park United Church in Toronto has ushers monitor the vestibule doors to keep them shut when they are not needed.

b. The Sanctuary

Windows: Examine all the windows in the building. Are any of them broken? If you have "bucket" windows, do they fit snugly? Do the closing devices work and really close the windows?

Are all of the windows — including memorial windows — well-caulked? If not, consider enlisting the help of someone in the congregation to do this.

Double-glazing is another, medium-cost way to ensure that your windows are not a source of excessive heat loss.

Double-glazing of memorial windows is more expensive, and usually cannot be justified on the basis of energy savings alone. In certain cases, however, double-glazing can help eliminate vandalism by providing a shatter-proof barrier between the outdoors and the stained-glass windows. Insurance costs for memorial windows can be reduced once the double-glazing is installed. The cost must be weighed carefully against the advantages of cutting heat loss and preventing damage. There's not much justification in spending $3,000 on double-glazing if the window in question is not likely to be broken and if the energy savings will be only about $50 per year!

Organ: Examine the organ in the sanctuary. Electric or electronic organs pose no problems in terms of energy conservation, but pneumatic pipe organs require constant temperatures to retain their tuning. You don't have to heat the whole sanctuary to keep the organ in tune. Spot electric heaters can keep the organ at a constant temperature.

If your organization is heating the sanctuary so that the organist can practice, consider scheduling practice sessions so they occur immediately before or after a time when the sanctuary is heated for another purpose.

Destratification Fans: Destratification or ceiling fans can be used to help move warm air from the ceiling to the lower levels where it is needed.

If you are thinking about installing destratification fans, there are three major points to consider.

First, is the temperature difference between the floor and the highest point of the ceiling big enough to warrant installation of fans? A temperature difference of about 10°C (18°F) is justifiable. Fans work best if the ceilings are high. If your ceiling is four metres (14 feet) or lower, fans will probably not be worthwhile.

Second — make certain the benefits justify the costs! Remember that maintenance can cost 20 to 25 per cent of the capital costs over a five-year period. Proper maintenance procedures should be taken to insure long life. Remember to include the cost of electricity in your calculations as well.

Third — there are many different types of fans. It pays to shop around or to get the advice of a consultant, in order to find a fan that will meet the needs of your building.

Destratification fans can provide an effective means of redistributing heat that often gets trapped at ceiling level. But it is important to investigate fans carefully before you install them in your religious building. There are many types of fans and if they are inappropriate for the application or if they are improperly installed, they can do more harm than good.

If you have already installed destratification fans, make sure they are operated only when needed and at the speed most advantageous for each situation.

Check to see whether the temperature difference between floor and ceiling has been measured. And check on the cost effectiveness — do the benefits of the fans still look worthwhile when power and maintenance costs are taken into account?

Thermostat Setback: Since sanctuaries are usually very large rooms and are used just one day a week, it makes sense to turn down the heat when they are not being used!

If your heating is already automatically (thermostatically) controlled, check the temperature setting on the thermostat(s). Is the temperature set back when the sanctuary is unoccupied? Who is responsible for doing it? To what level is the temperature set back?

What length of time is required to bring the sanctuary up to an acceptable occupancy temperature? And — given that people provide heat — what is the temperature of the sanctuary when it's occupied?

There are no hard and fast rules for temperature settings, but generally 19 to 21°C (67 to 70°F) when the room is occupied, and 10 to 13°C (50 to 55°F) during unoccupied periods forms a comfortable range.

Utilities can provide many valuable energy conservation services. Here, an Ontario Hydro representative conducts an energy audit of a religious building.

Temperature control devices range from under $100 for a simple thermostat, to a few hundred dollars for setback devices, to many thousands of dollars for sophisticated energy management systems. Control manufacturers, heating contractors or consulting engineers can all provide useful advice on temperature control systems.

c. Other Facilities

Now examine some of the other facilities — auditoriums, kitchens, washrooms, gymnasiums and meeting rooms. In some cases, these facilities may be contained in buildings separate from the sanctuary, while in other cases they are part of the main unit.

Keep in mind that some of the opportunities discussed in this section of the booklet — lighting, insulation and ventilation, for example — can also apply to the sanctuary.

Heat Zoning: It is a good idea to operate the sanctuary separately from the associated facilities, because it is usually used at different times. If the facilities are not on a separate heating zone, you might want to consider either "zone control" or individual room controls.

Occupancy: If you are unable to control *where* you heat within the building, you can control *when* you heat.

The key is scheduling. Look at the various activities that take place during a typical week.

If the sanctuary and other facilities are in the same heating zone, consider scheduling some of the other activities for times when the sanctuary is heated, or immediately before or after the sanctuary has been used.

If there are individual controls, the potential for savings becomes even greater. Determine whether some of the activities can be held on the same night of the week or in the same heating zone to save on energy costs. Make certain that you are not heating huge areas to accommodate very small gatherings.

Attention to scheduling can have a major effect on the heating costs of your building(s).

The Anglican Church of Canada helped fund this active solar installation at St. Barnabas Church in London, Ontario. The system consists of collector panels mounted on the roof, a heat storage unit in the basement, an air handling unit and connecting ductwork. Air is forced past the collectors where it picks up heat absorbed from sunlight. The solar heated air is then used to heat the building directly, or it is diverted into the storage unit for later use. — (Photo courtesy Watershed Energy Systems.)

Doors and Windows: All of the measures that apply to the sanctuary doors and windows apply to other facilities as well. Look at windows in these areas. Have they been double-glazed and/or caulked?

Exterior doors should also be examined to determine whether weatherstripping should be restored or applied.

Hot Water: What is the condition of the water faucets? Are they dripping? A simple washer can often remedy the situation. Check any showers or toilets to make sure they are functioning properly. Consider fitting low cost conservation faucet aerators.

Lighting: The most obvious measure is to turn off the lights when the facilities are not in use. This measure is "old hat" by now, but it still saves energy!

Study the lighting level in halls, meeting rooms, etc. Is it excessively bright? While it is important to have bright lighting in certain areas of the building, other areas can be more dimly lit and still fulfill their function.

Get the advice of a professional if you are considering changing the lighting system. Your local public utilities commission can provide this advice and information. (See *Energy Saving in Religious Buildings, Volume I* for more information about efficient lighting sources).

Ventilation: Achieving proper ventilation is a balancing act — while too much ventilation wastes energy, too little can cause problems such as a buildup of carbon monoxide, other noxious gases and odours.

It is best to get the advice of a specialist when you are contemplating any changes in ventilation.

It is important to use the minimum ventilation practicable when the heating system is on, opening ventilators or switching on exhaust fans only when necessary. You might want to consider putting timers on large exhaust fans to switch them off automatically after a complete air change.

This also applies to halls. However, in crowded rooms and enclosed spaces, especially those with fireplaces or radiant heaters, care should be taken to ensure sufficient air changes.

A note about insulation: The application of insulation is one of the first measures many people think of when considering conservation. While insulation can provide substantial savings, it is not always the best solution for a particular building.

Some religious buildings — especially those with unusual shapes and high ceilings — are more expensive and difficult to insulate than others.

When considering an addition or if renovations are necessary, including insulation is a relatively simple matter.

But if you are considering installing insulation under other circumstances, it is important to look carefully at the costs and benefits.

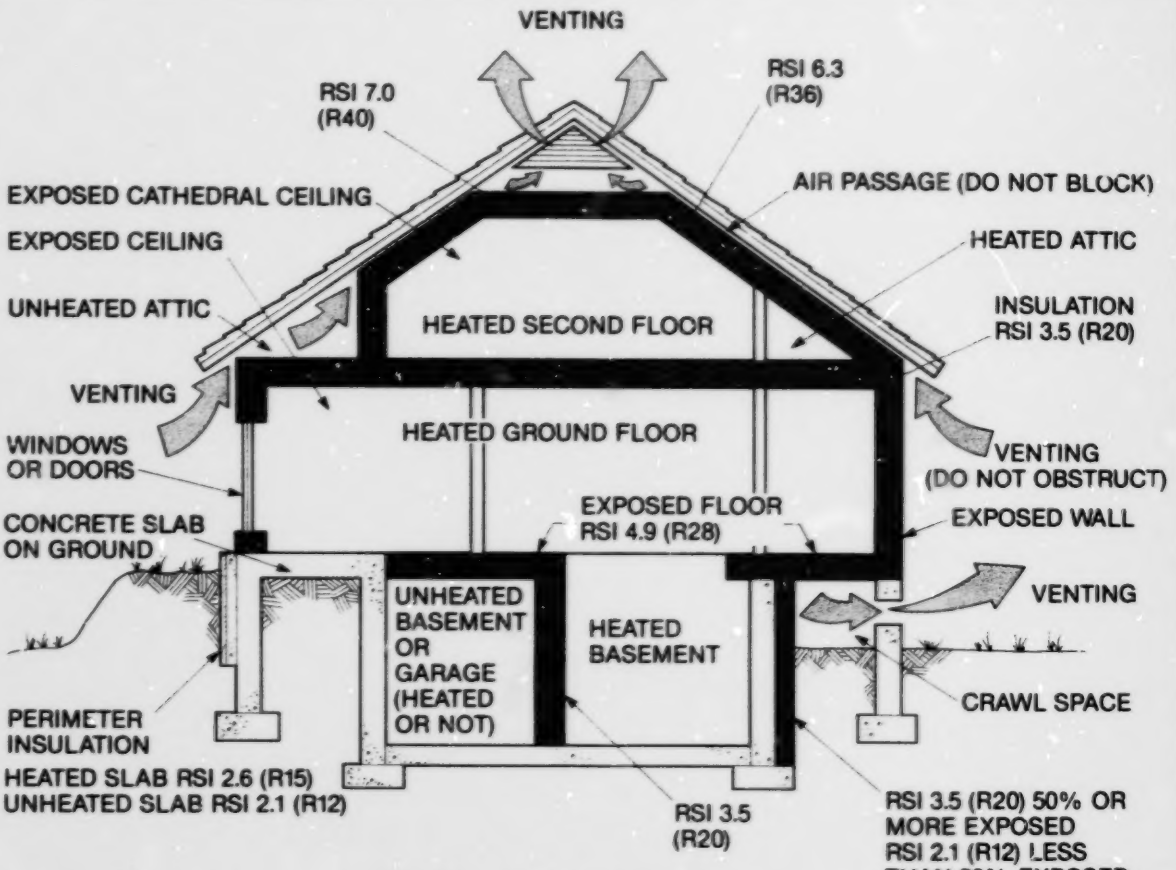
It makes less economic sense to insulate parts of the building(s) that are used for only a few hours a week than it does to insulate those used more often. Another factor is climate — savings will be much greater in a colder climate.

If you do decide to insulate, it's a good idea to get estimates from at least three contractors (see Technical Assistance, page 22).

Once the job is finished, inspect the work thoroughly. Two key elements are adequate ventilation and a proper vapour barrier to ensure that moisture does not damage the structure or the insulation.

Figure 3 shows some insulation considerations that you may find helpful when you are surveying your religious building(s).

Figure 3 - Super Energy Efficient Insulation Standards for New Religious Buildings or Residences.*



* *Please note that the RSI(R) standards given here are suitable for super energy efficient religious residences. Contact the Ontario Ministry of Energy for advice regarding standards for sanctuaries and other facilities.*

Diagram courtesy of Ontario Hydro.

d. Furnace or Boiler Room

Evaluating the heating system: Study the type of heating system that has been installed in your building(s), such as warm air, steam, hot water, or electric. What fuel is used? What has been the cost for each of the last three heating seasons?

What are the maintenance costs and who carries out the service needs? Is the maintenance on a per-call or a fixed-price basis?

What is the age of the equipment? Has it been well-maintained and kept at an efficient operating standard?

Answers to these questions will determine what action if any should be taken to improve the operating procedures, maintenance or service. In some cases, you may decide to replace the equipment.

Oil-fired furnaces, such as this one, require special attention. It is important to operate and maintain oil furnaces properly. Conversion from oil to gas is often a practical and money-saving alternative.

Heat loss through piping: High temperatures in crawl spaces, under floors or in unoccupied areas are certain evidence of heat loss due to uncovered or poorly insulated pipes and ducts.

Have a good look at any exposed pipes or ducts. If they are not insulated, you should consider wrapping them with insulation.

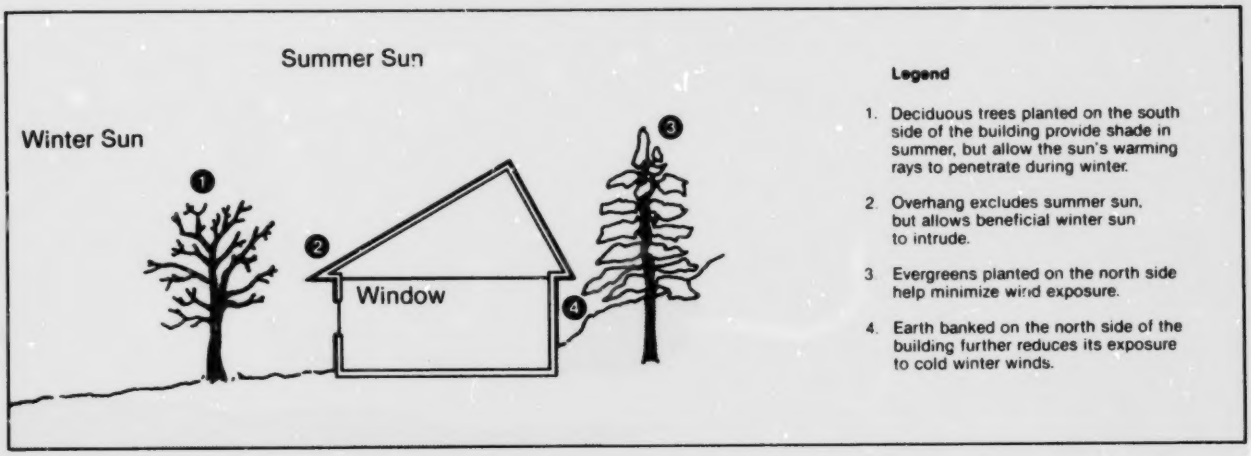
Evaluating chimneys or stacks: Examine the chimneys or stacks on the building(s). The height of the stack is important — especially if the heating system has been converted at some time. The chimney height requirements for coal, oil and natural gas are all different.

Condensation can occur in a chimney if it has three sides exposed. It can also occur if the chimney is oversized, unlined or has leaks through the mortar. Condensation can damage the chimney and, in extreme cases, cause blockages due to fragments of broken brick, mortar and even ice. For safety and economy, the chimney base should be inspected through the clean-out door at regular intervals during the heating season.

Other symptoms of chimney problems include evidence of moisture running down the wall beneath the clean-out door, a white powdery substance on the outside of the chimney brickwork, or broken or deteriorated brick or mortar on the exterior of the chimney.

If these symptoms occur, you should have the chimney repaired and, if necessary, install an approved chimney liner. Your local utility can provide a great deal of assistance in correcting chimney problems.

Figure 4 – Passive Solar and Landscaping Features.


Summer Sun
Winter Sun
1
2
Window
3
4
Legend
1. Deciduous trees planted on the south side of the building provide shade in summer, but allow the sun's warming rays to penetrate during winter.
2. Overhang excludes summer sun, but allows beneficial winter sun to intrude.
3. Evergreens planted on the north side help minimize wind exposure.
4. Earth banked on the north side of the building further reduces its exposure to cold winter winds.

e. Outdoors

Landscaping to make use of passive solar heat and to provide protection.

If you're thinking of doing some landscaping on the grounds of your religious building(s), there are a number of measures to help you achieve energy savings. See Figure 4.

More information on passive solar heating can be found in *Energy Saving in Religious Buildings, Volume I.*

Foundations and crawl spaces: To check on the amount of heat loss through foundations, observe the growth of shrubs or plants adjacent to the building in winter. Plant growth by the side of the building in midwinter may indicate extensive heat loss. In other words, tulips in February may be cheery, but they may also indicate a problem!

If you discover you have such a heat loss problem, you may want to consider measures such as insulation (see "A Note About Insulation", page 12).

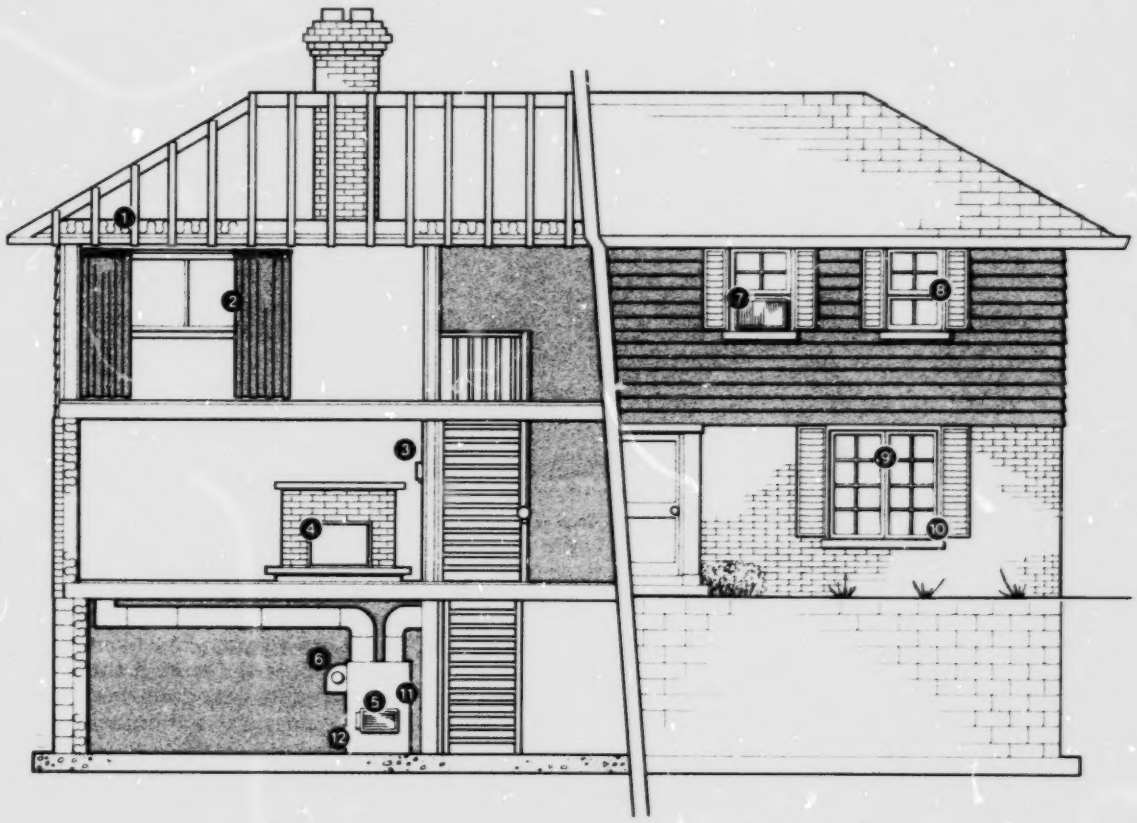
f. Residences

Religious dwellings should be surveyed in a manner similar to your other buildings. These houses are like any others, and there are many opportunities for energy management.

Passive solar landscaping features can apply to religious residences as well (see Figure 4). Figure 5 shows some of the major energy conservation measures to consider for your organization's religious residence.

The Ontario Ministry of Energy and your local utility can provide a great deal of useful information about residential energy conservation.

Figure 5 - Energy Savings in Existing Religious Residences.



Legend

1. *Insulation:* Most homes need at least 6" in the attic and 3 1/2" to 4" in the walls. It pays for itself in the long run.
2. *Drapes*: Open your drapes for the sun's heat during the day. At night, closed drapes are a form of insulation.
3. *Thermostat:* Permanently lowering your thermostat by 6 degrees C can cut your fuel consumption by as much as 10%. Have your thermostat checked periodically for proper cycling.
4. *Fireplace:* Whenever your fireplace is not in use, be sure to keep the damper closed to prevent heat loss through the chimney.
5. *Furnace Filters:* Dirty filters put a strain on your furnace, block the circulation of air and cost you money. Change them frequently. Keep heating ducts and cold air returns clean and clear.
6. *Humidifier:* It replaces moisture in the air that heat removes. You can lower the temperature and feel just as warm. Keep it at a balance level of approximately 40%.
7. *Window Air Conditioner:* During winter cover it with heavy plastic sheet to prevent draughts, or remove it for storage.
8. *Caulking:* Replace caulking around windows and doors to minimize heat loss.
9. *Storms:* Storm windows and doors are essential to cut heat loss and prevent draughts.
10. *Weather Sealing:* Inexpensive felt-strips will stop most draughts. Hardware stores carry sealing for exterior doors.
11. *Burner Inspection:* Have your furnace cleaned at least each year. Dirt and soot can cut operating efficiency.
12. *New Furnace:* If your furnace is old, a newer, more efficient heating unit could pay for itself in lower fuel bills over a few years.

Courtesy Shell Canada

Getting Your Conservation Committee Involved

Your organization may already have taken the first crucial step toward energy conservation — appointing an energy conservation co-ordinator and committee.

The co-ordinator should be someone who is knowledgeable about your building(s) and about energy conservation — possibly the property manager or building committee chairman for your organization. Other members of the committee should include people with a broad range of expertise — not only builders, architects, engineers and tradespeople but also someone representing the financial side of the organization. But keep it manageable! Your energy conservation committee should be made up of no more than about seven people.

Let the conservation committee know what you found out in your survey. Committee members can help you tabulate and record the details of items to be considered for correction, alteration or improvement.

Together you can draw up a list of conservation priorities, and make decisions regarding financing. It helps to put each of the planned activities in order by assigning them a priority:

1. projects that can be implemented immediately at no cost.
2. activities requiring a modest expenditure that can be implemented using the current budget.
3. major alterations requiring professional advice or contractor assistance.

Tulips in February are a welcome sign of spring, but an unwelcome sign of heat escaping from walls and foundations. Unusual growth around the base of a building may signal a need for more insulation or sealing.

There are many benefits in getting the whole congregation involved in energy conservation. St. Andrew's Presbyterian Church in Scarborough invited Walter Chick of the Ontario Ministry of Energy to talk to the congregation about saving energy in the home and in the church.

First Things First
It is sensible to implement all of the "housekeeping" or no-cost measures first, and to plan ahead for more costly activities.

When your group is getting ready to take action, don't overlook another source of assistance — other religious organizations. These include other congregations, as well as various denominational and inter-denominational groups. Many of these people have already investigated energy conservation and your group can often benefit from their experience.

As an example of co-operation among congregations, about 50 Mennonite churches in the Kitchener area have set up a common committee to share ideas on energy management.

There's no need to re-invent the wheel! Talk to others and share their ideas. We have provided two case histories to show just what some Ontario congregations have already accomplished. A list of the organizations mentioned in this booklet appears at the end.

Professional Assistance
Your committee can help decide whether each job can be done "in-house" by members of the congregation, or whether it requires an outside contractor.

If the job does call for an outside contractor, you are well-advised to prepare a "specification" outlining work to be done, giving a list of tasks and completion dates. Use contacts within your organization or from other organizations to get a list of reliable contractors. Invite at least three to submit a bid or estimate for the job. Obtaining more than five bids is probably not worthwhile.

When you receive the prices, review each tender (or bid) to make sure that it complies with your specifications and with work to be done. Make sure you know which materials and equipment will be supplied and whether you will be expected to supply anything. Ensure that the equipment is adequate for the job and for the quality required.

Usually, contracts are awarded to the lowest bidder provided that bidder has complied with all the details outlined in the specification. There may, however, be considerations other than price which may influence the awarding of any contract.

Conclusion

You have surveyed your religious building(s) from the front steps all the way down to the furnace room or boiler. You have worked with a committee to establish the most effective conservation plan for your organization. You are now ready to implement the program and measure your results.

Those results should be encouraging, because your plan has the three essential elements of a successful energy management program — care, thought and co-operation.

Two Case Histories

Bell's Corners United Church, Nepean
The Energy Situation: Bell's Corners United Church is the house of worship for about 600 families. The sanctuary, a meeting hall and offices were built in 1962. This section of the church has an oil-fired hot air heating system with two furnaces. In 1969, a new Sunday school wing was added, consisting of classrooms and a multi-purpose room. This section of the church has electric baseboard heating.

Action Taken: The church started its program in 1980/81, and since that time, has implemented a number of measures.

Year 1: The energy conservation committee installed three ceiling fans to circulate warm air downwards from the sanctuary's high, peaked roof at a total cost of $600 for three fans.

After a survey of the lighting by Nepean Hydro, the committee removed every fourth fixture in hallways and classrooms. This no-cost measure caused no negative reactions from the congregation.

Year 2: The two 18-year-old oil furnaces were replaced with new gas furnaces. This measure cost $4,100 once the congregation took advantage of the federal government's off-oil grant.

The congregation had been thinking about replacing the weathered, ill-fitting, exterior doors on the church. These were replaced with new steel doors installed at a cost of $6,000.

After inquiring with the manufacturer, the energy committee discovered that the church's Cassavant organ could tolerate temperatures of 10°C (50°F). The temperature in the sanctuary was then set back when the sanctuary was not in use. The committee believes this caused considerable damage.

The sanctuary temperature was set back by using two thermostats and a timer. One thermostat was set at 10°C (50°F) all the time. The second was timed to

come on only when additional heat was required, such as during services or choir practices. The cost of the timer and the second thermostat was $100.

The sanctuary walls were extended up to the ceiling and insulated on the inside at a cost of $1,500. Labour for the project was provided by members of the congregation. This measure was particularly effective because it blocked off areas that had been responsible for a great deal of heat loss.

Polystyrene insulation sheets were used to block out a number of high windows in the church that did not let in much light. This measure cost $400.

In the washrooms, every time the lights were switched on, exhaust fans came on as well. The church installed timers at a cost of $40, and asked people using the washroom to set the timers when they entered. The lights and fans would then shut off automatically. It's a small measure that has proven very effective.

St. John's Anglican Church in Bowmanville, Ontario saved a substantial amount on its energy bills by replacing its old oil furnace with gas.

The electrically-heated part of the church is used as a nursery school during the week, and this portion of the church now has a dual thermostat system similar to that used in the sanctuary. The cost of this system was about $150.

Thermostats in all halls have been turned down to 18°C (65°F).

The Results: In 1979/80, before any conservation measures were implemented, Bell's Corners United used about 27,300 litres (6,000 gallons) of oil and 147,100 kWh of electricity. If the church had continued to use oil and electricity at that rate, its energy costs for 1982/83 would have been $5,600 for oil and $7,700 for electricity; a total of $13,300. Instead, the church paid only $3,000 for natural gas and $4,300 for electricity; a total of $7,300. This means the church reduced its energy costs by 45 per cent.

The congregation of St. John's also decided to switch the rectory furnace from oil to gas.

St. John's Anglican Church, Bowmanville

The Energy Situation: St. John's Anglican Church in Bowmanville is a medium-sized church. It is one of the oldest churches in the province — built 145 years ago. A few years ago, the oil heating system at St. John's broke down and the church had to decide either to repair the existing system or to replace it. At the same time, the heating system at the manse was getting old, and the energy committee decided to look at replacement of that system as well.

Action Taken: The committee decided to install natural gas in the church, because the cost of heating with gas was less than that of oil. The cost of the project was $8,500, part of which was reimbursed under the federal government's off-oil program. The heating system at the rectory was changed from oil to gas at a cost of $1,500 — a conversion that was also eligible for an off-oil grant.

The Results: St. John's has saved about $300 per year — or one quarter of its oil bill thanks to the new natural gas furnace in the church building. In addition, the church saved the $350 to $400 per year it was spending to maintain and service its old oil heating system.

The parish has also saved $200 per year by switching the rectory heating system from oil to gas.

Technical Assistance

Ontario Ministry of Energy
The Ontario Ministry of Energy provides technical advice and resource materials to help you get your energy conservation program started and to provide support as the program continues.

The ministry has a team of experts who can deal with your queries about energy conservation. These experts can provide energy-saving information, encourage energy-efficient practices and assist in planning renovations, alterations and conversions from oil heating.

The ministry also offers group meetings that include workshops, case histories, and up-to-the-minute information on saving energy in religious buildings. If you are interested in hosting or attending a group meeting, contact the Advisor, Energy Conservation in Religious Buildings.

Resource materials available from the ministry can help you identify many low-cost opportunities which can yield significant savings in both existing and new facilities. See "For More Information."

To find out more about these activities, contact:

The Advisor,
Energy Conservation in Religious Buildings,
Ontario Ministry of Energy,
56 Wellesley St. W.,
Toronto, Ontario M7A 2B7.
Telephone (416) 965-3053

Other Governments and Corporations
Other governments and your local utilities can provide valuable assistance too. The federal government, Ontario Hydro, oil suppliers and gas utilities have energy conservation information that's free for the asking. There are also several private corporations actively promoting energy conservation programs and equipment. They, too, can provide valuable information.

For More Information

Publications from the Ontario Ministry of Energy
Resource materials dealing specifically with the Ontario Ministry of Energy's Conservation in Religious Buildings Program include the following:

Saving Energy in Religious Buildings. An introductory pamphlet on energy conservation.

Energy Saving in Religious Buildings, Volume I. An introductory booklet on energy conservation.

Energy Saving in Religious Buildings, Volume II: Putting Practical Ideas to Work. A booklet outlining the "walk-through" approach to identify energy conservation measures.

Saving Energy in Religious Buildings — A Five-Step Program. A manual that shows you in detail how to set up an energy conservation program. To obtain this manual, you must appoint an energy co-ordinator and fill out a survey form for your building. For more information, write to The Advisor, Energy Conservation in Religious Buildings, 56 Wellesley St. W., Toronto, Ontario M7A 2B7.

Other Ministry of Energy publications include the following:

Energy Security for the Eighties: A Policy for Ontario.

Ontario Energy Review.

With the exception of the manual, these publications can be obtained by writing to: Publications Services Section, 880 Bay St., 5th Flr., Toronto, Ontario M7A 1N8.

Other Publications
Energy Conservation in New Building Design. ASHRAE STANDARD 90A. 1980. Available from A.S.H.R.A.E. Inc., 1791 Tullie Circle NE, Atlanta, GA 30329.

The Energy Efficient Church. Edited by Douglas R. Hoffman. The Pilgrim Press, 287 Park Ave. South, New York, NY 10010. Also available from the bookrooms of Canadian religious organizations.

Energy Conservation in Religious Buildings. Available from Energy Technology Centre, University of Wisconsin Extension, 432 North Lake Street, Madison, WI 53706.

Make the Most of It! A Practical Guide to Energy Conservation in Churches. Available from The Society, Religion and Technology Project, Church of Scotland, 121 George Street, Edinburgh, Scotland EH2 4YN. Also available from the bookrooms of Canadian religious organizations.

Religious Organizations Mentioned in this Booklet

Bell's Corners United Church,
3955 Richmond Road,
Nepean, Ontario
K2H 5C6
(613) 820-8103

Deer Park United Church,
129 St. Clair Ave. W.,
Toronto, Ontaric
M4V 1N5
(416) 962-3381

St. Andrew's Presbyterian Church,
115 St. Andrews Road,
Scarborough, Ontario
M1P 4C7
(416) 438-4100

St. Barnabas Anglican Church,
251 Merlin Crescent,
London, Ontario
N5W 5A5
(519) 451-6854

St. George's United Church,
35 Lytton Blvd.,
Toronto, Ontario
M4R 1L2
(416) 481-1141

St. John's Anglican Church,
11 Temperance Street,
Bowmanville, Ontario
L1C 3A3
(416) 623-2460

Acknowledgements

This booklet is based on more than 600 contacts and 100 personal walk-through visits carried out on behalf of the Ontario Ministry of Energy's Religious Buildings Energy Conservation Program.

Copies available free of charge from
the Ontario Government Bookstore,
880 Bay St., Toronto.
Out-of-town customers write to
Publications Services Section, 5th Floor,
880 Bay St., Toronto, Ont. M7A 1N8.
Tel. 965-6015. Toll free long distance
1-800-268-7540; in Northwestern Ontario
0-Zenith 67200.
A charge may apply to bulk orders.

ISBN 0-7743-8814-5
5M/03-84/537-01